PROJECT CASE STUDY 2024

Gosforth Depot

Train control and signalling

STADLER / VOLKERFITZPATRICK

Completed 2024

FENIX RAIL SYSTEMS



The Background

Gosforth Depot operated by Nexus as part of the Tyne and Wear Metro Network, is situated just north of South Gosforth station, nestled between the Airport and Tyne Coastlines. Originally established in 1923 as South Gosforth Car Sheds by the London North-eastern Railway, its primary purpose was to maintain the Tyneside Electrics introduced by its predecessor, the North-eastern Railway. For four decades, it diligently serviced the Metro car fleet (class 599) from its base. Controlled by an antiquated OCS control panel located in the depot control room and adjacent relay interlocking system, the depot's operations were closely linked to the Nexus signalling control centre at South Gosforth, which utilized an RTMS system.

With the introduction of the new Nexus Metro (Class 555) train fleet, with train builder Stadler taking over responsibility, the depot required extensive remodelling and the implementation of a cutting-edge train control system that could seamlessly integrate with the existing mainline interlocking system.

The Mission

Fenix Rail Systems received an invitation from our clients, Stadler and Volker Fitzpatrick, to propose an efficient and cost-effective modern train control interlocking system. Consequently, Fenix was selected to provide cutting-edge technology that would play a pivotal role in overseeing train movements within their newly redeveloped train facility, a £70 million project. Fenix's committed to delivering an innovative solution that not only improved operational efficiency but also prioritised safety and operational flexibility. Our clients emphasized the importance of a system that could be easily modified and upgraded with minimal hardware or software adjustments, ensuring adaptability for the future. In response to this challenge, Fenix dedicated itself to the full spectrum of control system development, encompassing scheme development, detailed design, seamless interface integration, installation, rigorous testing, and successful commissioning. The result is a state-of-the-art train control interlocking system that meets the client's exacting requirements and elevates the functionality of the redeveloped train facility.

The revamped facility now boasts inspection roads and pits, a dedicated wheel lathe building, a train exterior cleaning station, storage space for spare parts and materials, as well as office facilities for training and support functions. Notably, eight new electrified roads were added to the depot, enabling Stadler to maintain the existing trains while accommodating the new ones. Remarkably, this entire project was executed without interrupting Nexus train operations and the continuous provision of train services to the Newcastle metro system.

The Project

Our valued clients, Stadler and Volker Fitzpatrick, entrusted Fenix Rail Systems with the implementation of a state-of-the-art train control system. This project was particularly crucial as the existing depot was previously controlled by an OCS control panel located in the depot control room and adjacent relay interlocking This system interfaced with the Nexus signalling control centre at South Gosforth, which relied on an RTMS system. However, a significant change was on the horizon, as the depot control room was slated for demolition to make way for a modern train maintenance building. Consequently, Fenix had to execute the project in stages to ensure uninterrupted rail services during these critical works. The control system selected was a SIL-2 equivalent CBI interlocking system, incorporating SIL 4 Pintsch axle counter wheel sensors, SIL 4 Pintsch point machines, and NR approved LED shunt signals equipped with Miniature Alphanumeric Route Indicators (MARI). A single operator can now manage and oversee all train movements within the depot through a Visual Display Unit (VDU). The new signalling system, along with its interconnected interface circuits to the South Gosforth Interlocking, found its home in a newly established REB positioned at the west end of the layout. Train movements in and out of the mainline are orchestrated via a carefully coordinated slotting arrangement between the mainline signaller and the depot controller. When a train needs access to the depot, the mainline signaller requests a slot from the depot controller. Once granted, the mainline signal, guarding the entrance to the depot, can be cleared for the upcoming manoeuvre. The depot control system, distinguished by its modular design philosophy crafted from high-grade industrial components, conducts continuous self-checks on the circuits. The project was selected as winner in the nation rail awards 2024. This is a testament to the interdisciplinary teams and the efforts of the whole project to achieve this goal.



Scope of Works

Develop the scheme from GRIP 4 concept through to GRIP 8, including installation, testing, commissioning, and project close out.

Cost effective solution, reducing maintenance costs and maximising efficient working of the depot.

Control tables, interface specification and project specifications to enable the detailed design to commence.

Interdisciplinary design checks (IDC) with the principal contractor and associated disciplines.

Detailed signalling design as per the Network Rail (NR) GRIP process with cognisance to Nexus signalling principles.

Detailed signalling interlocking modification to mainline relay circuitry to interface to the new depot CBI.

Full system design to accommodate bespoke client requirements.

Centrally controlled route setting interlocking controlled using VDU.

29 Trailable point machines including 4ft mount machines and 3 tandem 6ft mounted within the depot. 57 LED Signals, full axle counter train detection and an REB containing the depot control interlocking.

Bespoke client requirements include train management facility and integration with DPPS.



System Equipment

Computer based interlocking housed in REB with six control cabinets incorporating:

Power supplies.

Points controllers.

Signal drivers.

Axle counter evaluators.

I/O cards.

Condition monitoring.

Mainline relay interface.

Trailable 400 volt three-phase AC point machines.

NR-type LED shunt signals and route indicators.

Axle counters.



The Design Process

GRIP 4 – Single Option Development

Fenix Rail Systems produced the core document requirements for the scheme, based off the Arcadis high level requirements

Grip 5 – Detailed Design

Fenix Rail Systems produced the detailed design, including the equipment layouts, calculations and wiring diagrams.

Grip 6 – Construction Testing and Commissioning

Fenix Rail Systems worked with the Principal Contractor Volker Fitzpatrick for their client Stadler to deliver the project, which was installed and commissioned successfully. Fenix Rail Systems completed full hand back and training including operator and maintenance staff over a 2-week period. The final records were updated and completed and returned to the client.

Grip 8 – Project Formal Close Out

Fenix Rail Systems formally closed out the project, returning the Health and Safety file and completing lessons learnt with our client Volker Fitzpatrick on behalf of Stadler.



The Results / Key Achievements

The Result

The installation and commissioning of the project took place within a multifaceted worksite and environment. Fenix Rail Systems executed this phase with remarkable success, minimizing disruptions to other concurrent disciplines operating on the site. This achievement was the result of meticulous planning and the execution of a robust strategy for site activities. During this implementation, the worksite was officially designated as a construction site, facilitating smooth access and enabling a steady-state progression of the installation. As a result, possessions of the main line were minimized, allowing normal service to seamlessly continue around the depot construction.

Key Achievements

This highly intricate project presented its fair share of challenges, including global material shortages exacerbated by the Ukrainian War and the pandemic.

Fenix demonstrated its ability to deliver a design and implementation that prioritized high quality and safety. No incidents, accidents, or close calls were reported during the site works.

All design work was not only completed within budget but also successfully navigated the challenges posed by world events.

Procurement and delivery of the signalling hardware was meticulously organized on a 'just in time' basis, reducing the need for extensive on-site storage and enhancing overall efficiency and productivity.

Fenix forged strategic partnerships with multiple companies, which played a pivotal role in achieving a successful outcome.

Fenix seamlessly integrated the new system into the existing infrastructure.



Client Press and Project Films

CLIENT PRESS RELEASE

RailAdvent, 30 June 2023

Cathy Massarella, the Major Project Director at Nexus, shared her thoughts on this significant milestone:

"It's truly fantastic to witness the team at Gosforth depot transition to this modern new control suite, marking another significant step in our journey toward introducing the first new Metro trains into service.”

“The digital systems represent a remarkable leap forward in the management of train movements in and out of Gosforth depot. The improved facilities for our staff are a marked improvement over our previous depot building and are sure to transform their work experiences.”

“This move also sets the stage for the final phase of demolition work at the old depot. The depot controllers are the last group to relocate from the old building, but when you see the facility they are moving into, it's evident that the wait has been well worth it."

Watch the control room video

GOSFORTH WINS AT RAIL BUSINESS AWARDS

As part of the contract to supply 46 METRO trains to UK client, Nexus, Stadler has built a brand new depot in Newcastle, which will soon become their home. We’re thrilled that this construction project was named winner at the Rail Business Awards in the Infrastructure Project and Station Excellence category.

The new depot, which we’ve just finished, boasts unrivalled green credentials and a range of innovative features. We’re delighted to see this project recognised at these prestigious awards held in Manchester, UK, and thank Nexus and our construction partner VolkerFitzpatrick Ltd for all their support along the way.

Watch the depot timelapse

Gosforth Depot

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STADLER

VOLKERFITZPATRICK

FENIX RAIL SYSTEMS

Thank you

03300 580180

www.fenixrailsystems.com

Forward House, High Street

Henley in Arden, B95 5AA

TRAIN CONTROL AND SIGNALLING